Interactive Mathematics Program

(IMP)

Wanted to:

- broaden WHO leans mathematics;
- change WHAT mathematics is taught; and
- shift HOW mathematics is learned.

From the accountant who explores the consequences of changes in tax law to the engineer who designs a new aircraft, the practitioner of mathematics in the computer age is more likely to solve equations by computer-generated graphs and calculations than by manual algebraic manipulations. Mathematics today involves far more than calculation; clarification of the problem, deduction of consequences, formulation of alternatives, and development of appropriate tools are as much a part of the modern mathematician's craft as are solving equations or providing answers.[1]

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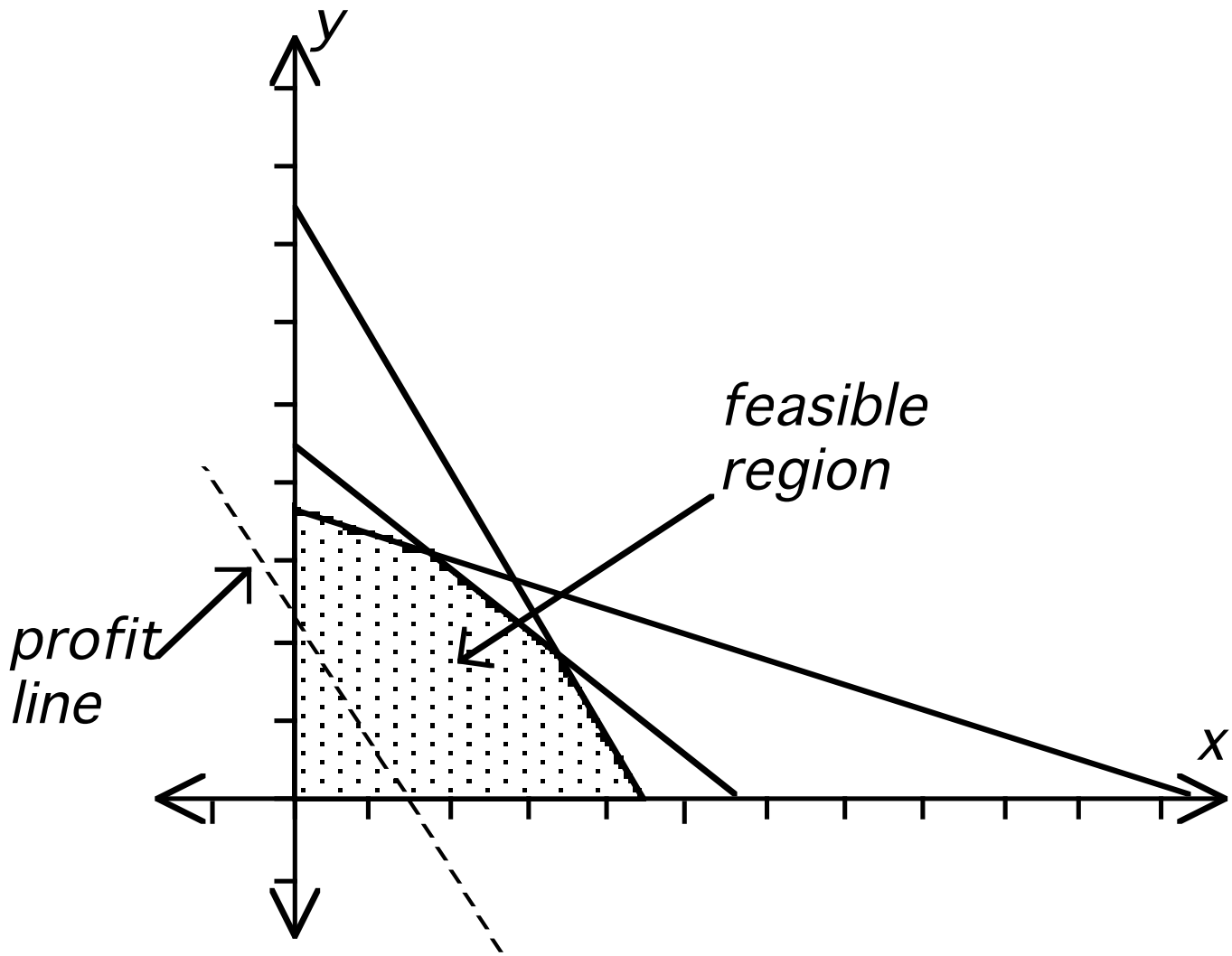
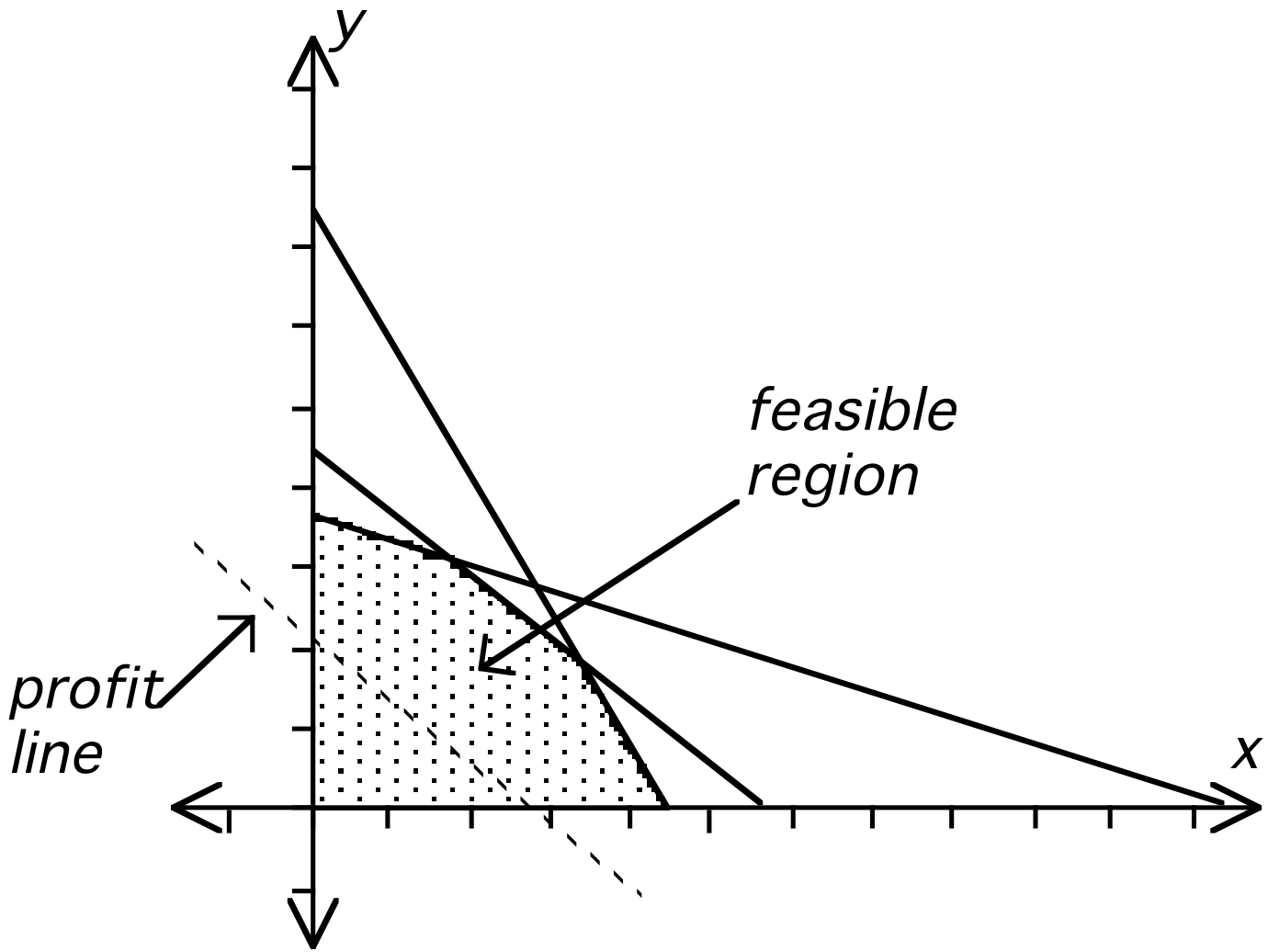
1 *Everybody Counts*, National Research Council, 1989, p. 5

Meadows or Malls

- Three pieces of land donated to the city.
- Part of each piece goes to development and part to recreation.
- A compromise results in a series of equalities and inequalities.
- Equalities and inequalities in 6 unknowns. Want to minimize costs. Costs of each kind vary.
- Review linear programming in two variables.


y
feasible
region
profit
line
x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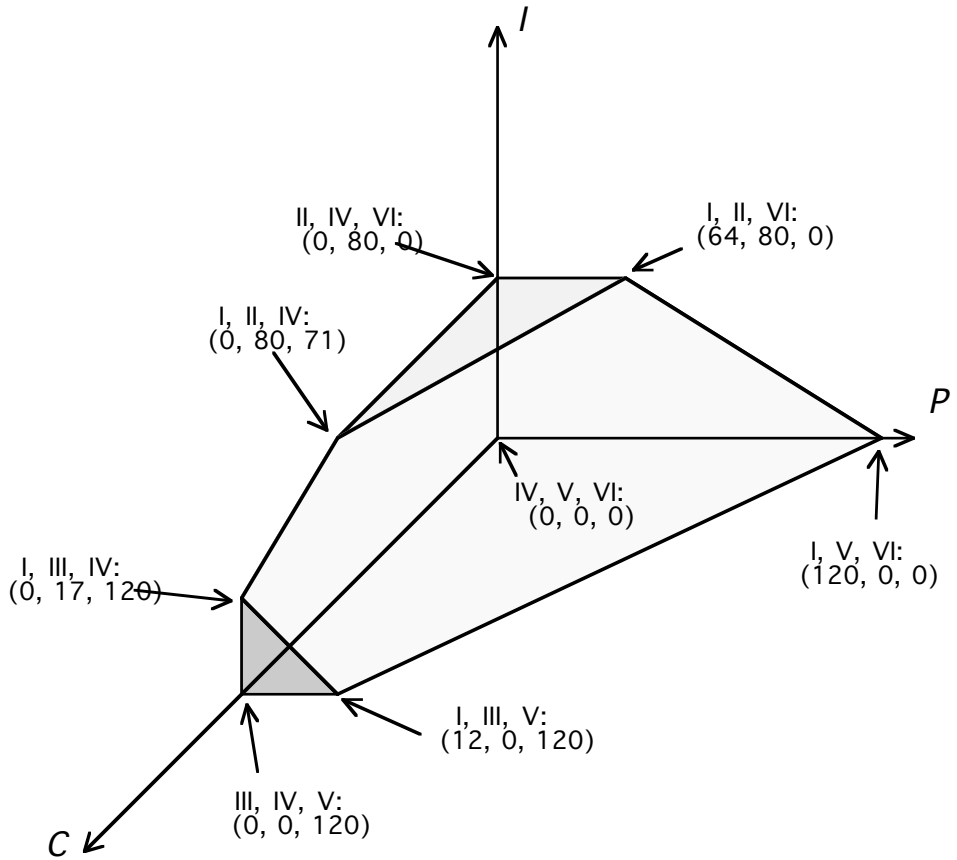
- Conclude that the maximum or minimum is always at a corner or along a line.
- Consider linear programming in 3 variables.


I
II, IV, VI:
(0, 80, 0)
I, II, VI:
(64, 80, 0)
I, II, IV:
(0, 80, 71)
P
IV, V, VI:
(0, 0, 0)
I, V, VI:
(120, 0, 0)
I, III, IV:
(0, 17, 120)
I, III, V:
(12, 0, 120)
III, IV, V:
(0, 0, 120)
C

Meadows or Malls

- 3 pieces of land with part recreation and part development.
- Equalities and inequalities in 6 unknowns. Minimize costs.
- Review linear programming in two variables.
- Consider linear programming in 3 variables.
- Solve the 3 equations in 3 variables using elimination.
- Through a class discussion, decide on a strategy for 6 variables where pictures are not possible.
- Try a linear programming problem with 4 variables. Finding corner points in daunting.
- Matrices are introduced to same work. They find inverting the matrices by hand does not save work.
- Graphing calculators are the solution, by entering matrices and multiplying by the inverses.

Homework 22: Three Variables, Continued

You know that the graph of a linear equation in three variables is a plane in 3-space. You also know that the intersection of three planes can be

- nothing
- a single point
- infinitely many points

The graph of each system of 3 linear equations below is a set of 3 planes. Determine the intersection and justify your answer.

Beginning Portfolios – Part I

This unit has involved several closely related ideas:

- Graphing linear equations in three variables
- Solving systems of linear equations in 3 variables
- Finding intersections of planes in 3-space

1. Summarize how these ideas are related. In particular, focus on the following two questions and how they are connected:
   - What are the possible results from solving a system of three linear equations in three variables?
   - What are the possible results of the intersection of three planes in 3-space?

2. Select activities from the unit that were important in developing your understanding of the ideas you discussed in Question 1, and explain why you made the selections you did.